



Complex interactions between temperature and relative humidity on water balance of adult tsetse (Glossinidae, diptera): Implications for climate change

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Abstract:

Insect water balance plays an important role in determining energy budgets, activity patterns, survival, and population dynamics and, hence, geographic distribution. Tsetse (*Glossina* spp.) are important vectors of human and animal disease occupying a wide range of habitats in Africa and are notable for their desiccation resistance in xeric environments. Here, we measure water balance and related traits [water loss rate (WLR), body water content (BWC), body lipid content (BLC) and body mass] in adult flies across a range of temperature (20-30 degrees C) and relative humidity (0-99%) combinations in four tsetse species from both xeric and mesic habitats. WLRs were significantly affected by measurement under different temperature and relative humidity combinations, while BWC, BLC, and body mass were less affected. These results provide support for mass-independent inter- and intra-specific variation in WLRs and survival times. Furthermore, water balance responses to variation in temperature and relative humidity are complex in *Glossina*, and this response varies within and among species, subgroups, and ecotypes in terms of both magnitude of effects and the direction of change. Different effects of temperature and relative humidity within and among experimental conditions and species suggests cuticular permeability and saturation deficit are likely to be key factors in forecasting tsetse water balance responses to climate variability. This complicates potential forecasting of tsetse distribution in the face of climate change.

Source: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3200560>

Resource Description

Early Warning System:

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Meteorological Factors, Temperature

Temperature: Fluctuations

Geographic Feature:

Climate Change and Human Health Literature Portal

resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

Global or Unspecified

Health Impact:

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: General Mosquito-borne Disease

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology:

type of model used or methodology development is a focus of resource

Exposure Change Prediction

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content